

Ultra-Low-Bitrate Compression of Visual Content with Generative AI: Toward Semantic Visual Communication

SPEAKER Dr. Giuseppe Valenzise

CNRS Senior Researcher

Laboratoire des Signaux et Systèmes,
CentraleSupélec, Université Paris-Saclay, France

DATE 10 Nov, 2025 (Mon)

TIME 10:30 AM - 11:30 AM

VENUE CS Seminar Room, Y6405, 6th Floor, Yellow Zone, Yeung Kin Man Academic Building, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong

ABSTRACT

The demand for high-quality and immersive visual content continues to outpace the capacity of current 5G and future 6G networks, making compression an essential component of visual communication. Despite major advances in video coding over the past decades, key challenges such as latency, energy efficiency, scalability, and robustness remain unresolved. This talk will focus on one of these challenges: achieving effective compression at extremely low bitrates, where traditional codecs fail to preserve perceptual quality. Learning-based approaches enable substantial bandwidth reduction by exploiting the structure and semantics of visual content and can operate in a generative regime, where visual data are reconstructed by conditioning a trained model on compact latent or semantic representations. However, efficiently navigating the rate-distortion-perception trade-off with these models remains a major open problem. I will illustrate these ideas through two examples: generative face video coding (GFVC), where realistic talking-face motion and texture can be synthesized from compact transmitted features, and generative 3D point cloud compression, where compact embeddings are used to guide a diffusion-based reconstruction. I will conclude by discussing how these concepts extend to semantic and task-oriented video communication, which generalizes traditional paradigms and opens new perspectives in this evolving field.

BIOGRAPHY

Dr. Giuseppe Valenzise is a CNRS senior researcher at the Laboratoire des Signaux et Systèmes, CentraleSupélec, Université Paris-Saclay, France, where he leads the Multimedia and Networking team. He is Editor-in-Chief of the Springer EURASIP Journal on Image and Video Processing. He received his PhD from Politecnico di Milano, Italy. His research covers image and video processing, with a focus on compression (traditional and learning-based), light field and point cloud coding, quality assessment, high dynamic range imaging, and machine learning for visual analysis. He has co-authored over 100 publications in these areas and received the EURASIP Early Career Award in 2018. Giuseppe was General Chair of ICME 2025 and regularly serves on organizing committees of flagship conferences such as ICIP. He has been Associate Editor for IEEE TCSVT, IEEE TIP, and Signal Processing: Image Communication. He is currently Chair of the IEEE SPS Multimedia Signal Processing Technical Committee and a member of the IEEE CAS Multimedia Systems and Applications Technical Committee.

All are welcome!



In case of questions, please contact Prof WANG Shiqi at shiqwang@cityu.edu.hk, or visit the CS Departmental Seminar Web at <https://www.cs.cityu.edu.hk/events/cs-seminars/recent-cs-colloquia>.